

REMARKS

A petition for a three month extension of time has today been filed as a separate paper and a copy is attached hereto.

The language added by amendment to Claims 1 and 15 defining the maintaining of a moist condition of the electrolyte membrane by permeation of generated water there through, finds support in applicant's specification, for example, page 3, last line to page 4, line 1. The recitations of vaporization for cooling, i.e., latent heat, finds support in applicants' specification, for example, in paragraph [0014], [0015] and [0067].

Newly added Claims 20 and 21 find corresponding description in paragraph [0043] of the specification. Newly added Claims 22 and 23 find corresponding description in paragraph [0068] of the specification, and newly added Claims 24 and 25 find corresponding description in paragraph [0018] of the specification.

It is respectfully submitted that the combination of Allen and Koschany is improper. At page 8 of the most recent office action the examiner argues that the teaching at column 10, lines 11-13 of Allen et al "clearly does not limit the invention to Allen to only those cells "referred to above."" Of course, the issue of obviousness is not dependent on the scope of the "invention to Allen" but, rather, on what the teachings of Allen et al, as a whole, fairly suggest to those skilled in the art. The undersigned

acknowledges that other teachings of Allen et al might arguably be construed, in isolation, as suggesting that the gas diffusing electrodes of their invention have a utility which extends beyond liquid electrolyte containing electrochemical cells, e.g., the discussion at column 1, lines 7-23. The counter-argument is that the only “stationary” electrolytes contemplated by Allen et al are the acid and alkali electrolytes mentioned at column 1, lines 23 and 30-31. Indeed, a fair reading of the entirety of Allen et al conveys no suggestion that the gas diffusion electrode of their invention might be applicable to a PEM fuel cell of the type disclosed in the examiner’s primary reference, i.e., the patent to Koschany.

The examiner’s point that the “flooding” described by Allen et al would also be applicable to PEM fuel cells, citing Meltser, is well taken. Indeed, the undersigned has now noted that the examiner’s primary reference itself teaches that the subject PEM cells are subject to a flooding problem. See column 2, lines 10-13 and column 6, lines 44-48 of Koschany.

It is respectfully submitted that a compelling reason why the two references should not be combined has been overlooked in previous prosecution. Specifically, if one were to make the allegedly obvious modification of Koschany in view of Allen et al, the result would be a cell which would not function in the manner intended and expressly taught by Koschany and, for this reason, one skilled in the art would not have

made the allegedly obvious modification of Koschany, i.e., use of the gas diffusion electrode of Allen et al as a cathode and/or anode in the PEM cell of Koschany. As taught throughout Koschany, the water introduced into channels 5 (column 6, lines 10-14) is intended to serve simultaneously as “membrane humidifying water” and for cooling. See, for example, column 5, lines 25-44 of Koschany. It must be noted that the fuel cell disclosed by Koschany has “different layers carrying a suitable catalyst” serving as the “anode region 3” and “cathode region 2” which are arranged on opposing sides of the electrolyte membrane 4. See Fig. 2, the description thereof at column 3, lines 53-62, and Fig. 1. It must also be noted that the electrodes of Allen are formed by application of a paste consisting of TEFLON and catalytic carbon as a coating on a surface of a carbon cloth. See, column 3, lines 51-64 and column 6, lines 12-25 of Allen et al. As is well known in the art and as is specifically taught at column 4, line 33 of Allen et al, such a paste is hydrophobic. Accordingly, substitution of such an electrode, with a hydrophobic coating, would not permit the “membrane humidifying water” to reach and moisten the PEM membrane of Koschany, in the manner described, for example, at column 5, lines 25-44 of Koschany. In the hypothetical modified structure of Koschany, the “membrane humidifying water” could not reach membrane 4 because it would be separated therefrom by a hydrophobic barrier, i.e. the TEFLON/catalyst paste coating of Allen et al.

Newly presented claims 20 and 21 serve to further distinguish the present

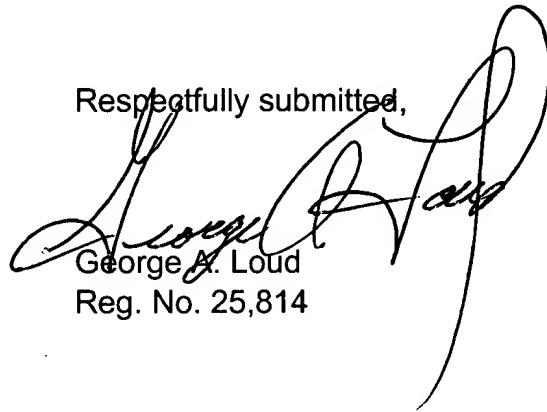
invention from the prior art in that, even if the references were properly combinable in the manner suggested by the examiner, the hypothetical modification would have the electrode or electrodes wherein the catalyst is a particulate admixture with TEFLON or other hydrophobic binder.

Regarding new Claims 22 and 23, as taught in paragraph [0067] of applicants' specification, applicants have found that "the capacity for cooling by latent heat tends [to] increase as the spray water quantity decreases." Accordingly, as applicants teach in paragraph [0068] of their specification, the method of the present invention preferably controls the supply of water to maximize cooling capacity of latent heat. Such a technique is not suggested by the prior art.

With regard to newly added claims 24 and 25 no reference of record suggests even the possibility of maintaining a PEM membrane in a suitably moist condition utilizing only the reactant water generated at the cathode.

In conclusion, it is respectfully requested that the examiner reconsider the rejections of record in view of the present amendments and the foregoing comments.

Respectfully submitted,

A large, stylized handwritten signature in black ink, likely belonging to George A. Loud, is written over the text "Respectfully submitted," and partially over the printed name and registration number.

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